The Increasing Problem of Unusual Pancreatic Tumors

Maureen Sheehan, MD; Carmen Latona, BS; Gerard Aranha, MD; Jack Pickleman, MD

Hypothesis: Patients presenting with a pancreatic mass often have a curable lesion rather than the more common adenocarcinoma. Greater awareness of this among nonsurgeons is necessary.

Design: Retrospective case series.

Setting: Tertiary care referral hospital.

Patients: All patients who presented with a pancreatic mass during the 8 years from 1990 to 1998 were studied. Patients with a history of chronic pancreatitis, a functioning pancreatic neuroendocrine tumor, or pancreatic adenocarcinoma were excluded. Forty patients were identified, demographic and clinical characteristics recorded, and long-term follow-up obtained.

Interventions: Therapy included either a Whipple procedure or distal pancreatectomy. Two patients underwent a biliary bypass.

Main Outcome Measures: Tumor histology, morbidity, and survival.

Results: Three hundred thirty-six patients with a pancreatic mass were treated during this 8-year period. Two hundred ninety-six of these had pancreatic adenocarcinoma. Forty (11.9%) of the 336 patients had other types of pancreatic tumors. Two thirds of these patients were female, with an average age of 57 years. Seventy-five percent of these tumors were either malignant or potentially malignant. In several instances, cystic tumors were diagnosed as inflammatory pseudocysts and managed accordingly. Fourteen (35%) of 40 patients had no symptoms and their tumor was found on a computed tomographic scan performed for another indication. Percutaneous biopsy was performed in 9 patients, of whom 5 were assigned an incorrect diagnosis. There were no operative deaths, although the postoperative complication rate was 23%.

Conclusions: In this series, nearly 12% of patients presenting with a pancreatic mass did not have pancreatic adenocarcinoma, but rather more favorable lesions amenable to operation. Curative procedures can be safely performed in centers seeing a large number of patients with pancreatic tumors, and the long-term results of extirpation are excellent.


Among physicians who do not routinely care for large numbers of patients with pancreatic diseases, there is a tendency to regard all pancreatic masses as adenocarcinoma and all pancreatic cysts as inflammatory pseudocysts. Underappreciated is the fact that many such patients have curable benign or malignant neoplasms. This often leads to inappropriate observation or interventional/operative treatment. More of these lesions are being documented in recent years, not only because of increased awareness, but also because of the increased utilization of ultrasound, computed tomographic (CT) scans, and magnetic resonance imaging to investigate a variety of patient complaints.

In 1996, the World Health Organization issued a new classification of pancreatic neoplasms, which led to an improved understanding of the natural history and optimal treatment of these conditions.1 In 1993, we reported a 13-year experience with these neoplasms from 1977 to 1990.2 Since then, we have noted increasing numbers of such patients and thought it would be appropriate to look at our recent experience and contrast it with our past series of such patients.

The 2 series of patients are presented in Table 1. In the early series, 27 patients per year were seen with a pancreatic mass; of these, 25 patients per year had adenocarcinoma.


SUBJECTS AND METHODS

An 8-year review of patients seen at the Loyola University Medical Center, Maywood, Ill, from 1990 to 1998 was carried out. All jaundiced or nonjaundiced patients presenting with a pancreatic mass were studied. Patients who had a diagnosis of chronic pancreatitis were excluded, as were all patients who had functioning neuroendocrine tumors, as they generally presented with symptoms of hormone excess rather than a pancreatic mass. Three hundred thirty-six such patients were found. Two hundred ninety-six had adenocarcinoma; each of these patients had a tissue diagnosis established at laparotomy or by percutaneous biopsy if the tumors were believed to be unresectable. The other 40 had a variety of benign and malignant tumors. Symptoms, signs, diagnostic tests, surgical treatment, tumor characteristics, and outcome measures were studied.

Overall, 27 (66%) of 40 patients were female; the mean age for the entire group was 57 years. Fourteen (35%) of 40 patients had no symptoms or signs, and their CT scan was performed for other indications. There was no correlation between the presence or absence of malignancy and the occurrence of symptoms. All patients underwent a CT scan. The average size of the 40 lesions was 5.5 cm, and 20 were cystic. Locations in the pancreas were as follows: head, 12; body, 11; and tail, 17. Abnormal liver function test results were present in 6 of 12 patients with tumors located in the head but in only 1 of 28 patients with lesions in the body or tail of the gland. Percutaneous CT-guided needle biopsies were performed in 9 patients prior to our assuming responsibility for their care; each of these core biopsy specimens was reviewed by our pathologists. Five of these patients were assigned an incorrect histologic diagnosis (Table 2). Operative treatment consisted of 10 Whipple procedures and 2 biliary bypass procedures for patients with unresectable tumors in the head of the pancreas. Distal pancreatectomy was performed in 28 patients, without concomitant splenectomy in 3.

There were no deaths, and the overall complication rate was 23%. Three of the patients who underwent a Whipple procedure developed a postoperative pancreatic fistula. Of the patients undergoing distal pancreatectomy, 2 developed a fistula, 3 an intra-abdominal abscess, and 2 a wound abscess. All fistulas closed spontaneously, and no patient required reoperation for any complication. Thirty (75%) of 40 patients harbored malignant or potentially malignant tumors. Average length of stay for the Whipple patients was 13 days; for the distal pancreatectomy patients it was 7 days.

SEROUS CYSTADENOMA

Seven women and 3 men, with an average age of 63 years, had serous cystadenoma. The average size of the lesions was 4.9 cm (range, 2.3-14 cm); 6 of the lesions were cystic and 4 were predominantly solid. Only 2 of these patients were asymptomatic. Eight had abdominal pain and combinations of nausea, diarrhea, and weight loss. One patient with a lesion in the body of the pancreas had a history of pancreatitis. Two lesions were located in the pancreatic head, 4 in the body, and 4 in the tail of the gland. Three needle biopsies were carried out; the results disclosed either normal pancreas or benign changes. One patient with a 14-cm mass in the head of the gland had progressive growth documented during a 12-year period and underwent a biliary and gastric bypass procedure after resection was attempted and abandoned. She remains minimally symptomatic 50 months afterwards. The other patient with a tumor in the head of the gland underwent a Whipple procedure and remains well after 80 months. Eight patients underwent a distal pancreatectomy; current information is not available on 1 patient. The other 7 remain well with an average follow-up time of 43 months.

Table 1. A Comparison of the Incidence and Types of Tumors in the 2 Series

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>No. of patients with pancreatic mass</td>
<td>353</td>
<td>336</td>
</tr>
<tr>
<td>No. with adenocarcinoma</td>
<td>322</td>
<td>296</td>
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<tr>
<td>No. (%) with other neoplasm</td>
<td>31 (8.8%)</td>
<td>40 (11.9%)</td>
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Table 2. Results of Percutaneous Biopsy

<table>
<thead>
<tr>
<th>Final Diagnosis</th>
<th>Needle Biopsy Results</th>
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<tbody>
<tr>
<td>Serous cystadenoma</td>
<td>Benign</td>
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<td>Serous cystadenoma</td>
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<tr>
<td>Serous cystadenoma</td>
<td>Benign</td>
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<tr>
<td>Mucinous cystadenocarcinoma</td>
<td>Benign</td>
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<tr>
<td>Neuroendocrine tumor</td>
<td>Adenocarcinoma</td>
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<tr>
<td>Neuroendocrine tumor</td>
<td>Neuroendocrine tumor</td>
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<tr>
<td>Solid pseudopapillary tumor</td>
<td>Serous cystadenoma</td>
</tr>
<tr>
<td>Solid pseudopapillary carcinoma</td>
<td>Adenocarcinoma</td>
</tr>
<tr>
<td>Intraductal papillary carcinoma</td>
<td>Benign</td>
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MUCINOUS CYSTADENOMA AND CYSTADENOCARCINOMA

Seven patients had these types of lesions; 6 were female, with an average age of 45 years. The average size of the lesions was 4.8 cm (range, 1.7-11.5 cm). Six lesions were cystic and 1 was predominantly solid. One lesion was located in the pancreatic head, 1 in the body, and 5 in the tail of the gland. Three patients, including 1 with cystadenocarcinoma, were asymptomatic. Four others had abdominal pain with or without additional symptoms. One patient with a mucinous cystadenoma in the tail of the pancreas had recurrent pancreatitis with hemorrhage into her cyst cavity. Five patients had a final pathologic diagnosis of mucinous cystadenoma; 2 had frank mucinous cystadenocarcinoma. One of these latter patients underwent a preoperative needle biopsy that disclosed only normal pancreas. One patient with a cystadenoma underwent a Whipple procedure and 6 had a distal pancreatectomy, including 1 patient who required a completion subtotal pancreatectomy, having previously undergone a distal pancreatectomy, partial cyst excision, and Roux-en-Y cyst jejunostomy. One patient with cystadenocarcinoma was lost to follow-up. The other is well 88 months postoperatively. All patients with mucinous cystadenoma remain well at an average follow-up of 47 months.

NONFUNCTIONING NEUROENDOCRINE TUMORS

Twelve patients had this lesion. Five of these were female. The average age was 60 years. Nine had solid tumors, averaging 5.2 cm (range, 1-11.5 cm). Four of these patients were asymptomatic, 4 had pain with or without other symptoms, and 1 patient had a palpable mass. One patient had associated pancreatitis. Five patients had tumors in the pancreatic head, 4 in the body, and 3 in the tail of the gland. Two patients underwent preoperative needle biopsy. One disclosed a neuroendocrine tumor and the other an adenocarcinoma resulting in a recommendation that the patient receive no treatment. Four of the patients with disease located in the head of the pancreas underwent a Whipple procedure. One patient with widely metastatic disease underwent a biliary bypass only; 7 other patients underwent a distal pancreatectomy. The 1 bypass patient was lost to follow-up after 10 months and is presumed to be dead. All other patients remain well at an average follow-up of 31 months.

SOLID PSEUDOPAPILLARY TUMORS

Five patients, all women with an average age of 56 years (range, 20-89 years), presented with this type of lesion. Four of these tumors were solid and 1 was cystic; the average size was 12.5 cm (range, 3-18.5 cm). Two patients were asymptomatic; 2 had abdominal pain and 1 had weight loss only. One tumor was located in the head, 2 in the body, and 2 in the tail of the gland. Two patients underwent percutaneous needle biopsy; 1 tumor was diagnosed as a serous cystadenoma and no treatment was advised. One patient with a malignant solid pseudopapillary tumor was diagnosed as having adenocarcinoma. All patients underwent either a Whipple procedure or a distal pancreatectomy. The patient who underwent a distal resection for frank malignant disease died 6 months postoperatively of metastatic disease. The others are well at an average follow-up time of 24 months postoperatively.

INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS

Three patients had this lesion, 1 with associated malignancy and 2 with ductal atypia. Two patients were female, with an average age of 59 years. Two patients presented with abdominal pain and 1 with diarrhea secondary to chronic pancreatitis. All 3 patients had main pancreatic duct dilatation ranging from 0.5 to 1.1 cm in diameter noted on endoscopic retrograde cholangiopancreatography. The patient with a malignant neoplasm had an associated 3-cm mass in the head of the gland requiring a Whipple procedure. This patient had undergone a prior needle biopsy that disclosed benign changes only. The other 2 patients underwent distal pancreatectomy. In all 3 patients, the resected margins were free of disease. All patients remain well with an average follow-up time of 52 months.

NONEPITHELIAL TUMORS

Three patients were found to have primary pancreatic sarcomas. All were female, with an average age of 43 years. All lesions were solid and averaged 4.5 cm in diameter. All patients had abdominal pain; 1 had a history of pancreatitis. Two patients with a mass in the pancreatic head underwent a Whipple procedure and the other patient underwent a distal pancreatectomy. One patient who underwent a Whipple procedure is well 26 months postoperatively. The other 2 patients have died of metastatic disease at 3 and 8 months, respectively.

In this study, we attempted to replicate the clinical setting in which patients, either with or without symptoms, are found to have a mass in the pancreas. We chose to eliminate those patients with chronic pancreatitis who present with a mass, as this diagnosis is often clear at the outset. We also eliminated those patients presenting with functional neuroendocrine tumors, as they are generally discovered not because of a mass in the pancreas, but rather because of the effects of specific hormone excess. In our setting, 40 (11.9%) of 336 patients did not have pancreatic adenocarcinoma. This is a much higher figure than is generally appreciated.3,4 Our experience leads us to believe that among primary care physicians there is an insufficient awareness of these conditions, with the general assumption that all solid pancreatic masses represent adenocarcinoma and all cystic pancreatic lesions represent inflammatory pseudocysts, even in the absence of a history of pancreatitis. In reviewing the prior care our patients received, many were subjected to multiple repeated tests, unnecessary and misleading needle
biopsies, and were given inappropriate recommendations for either observation or interventional/operative therapy. As most of these lesions are associated with an excellent prognosis if surgically treated, it becomes important to recognize the various tumors that may be encountered.

Serous cystadenomas are characterized by circumscribed tumors containing multiple small cysts, occasionally with a central calcified scar. Microscopically, cuboidal epithelium lines a large number of cystic spaces, which are filled with glycogen. As in our study, most patients with this lesion are women in the sixth decade of life.\(^2,3,5\) Up to 40% of these lesions may have areas of absent epithelium, giving the microscopic appearance of a fibrous lining that may mistakenly be interpreted as a pseudocyst.\(^3,8\) In our study, as in the literature, most patients with a serous cystadenoma are symptomatic\(^3,6-10\) and, although some authors have recommended observation for these lesions,\(^8,11\) this is probably unwise as the exact diagnosis often cannot be made without excision, the majority of patients are asymptomatic, and progressive growth can occur.\(^3,6,11\) In addition, a small risk of malignant transformation has been documented.\(^13,14\) Treatment should consist of complete excision, either by distal pancreatic resection or pancreaticoduodenectomy in good-risk patients.\(^5,6,12\) Enucleation is to be avoided, as postoperative fistula formation is more frequent and there is the ever-present danger of undertreating a more serious tumor.\(^6\)

Mucinous cystadenomas and cystadenocarcinomas likewise are more common in women and generally symptomatic.\(^2,3,5,7-10\) Since the report of Compagno and Oertel in 1978,\(^13\) it is recognized that these lesions may comprise a spectrum of histologic changes from benign to frank invasive carcinoma, and that with extensive histologic sampling most will be found to have malignant elements. Many present with large unilocular cysts, leading to misdiagnosis and treatment as for a pseudocyst.\(^7,8\) Complications, including hemorrhage and pancreatitis, can occur and all patients should undergo excision. One study looked at the successful management of 10 such patients by enucleation, and although these patients remained well at 4 years, the possibility of undertreating a cystadenocarcinoma is real enough that this procedure should not be considered standard therapy.\(^16\) Likewise, central pancreatectomy with Roux limb drainage of the distal gland has been advocated, but this procedure suffers from the same potential drawbacks as enucleation.\(^17,18\)

Nonfunctioning neuroendocrine tumors are less commonly noted than the foregoing tumors. Although most are solid, a few present as cystic lesions.\(^19\) One series revealed 58 such tumors during a 48-year period,\(^20\) another study revealed 34 patients in 8 years.\(^21\) No sex predilection is noted and most patients are asymptomatic with abdominal pain, weight loss, nausea, or jaundice. The differentiation of benign from malignant tumors can only be made with certainty by the demonstration of metastatic disease, and so all such tumors should be regarded as potentially malignant. Prognosis in these patients is far superior to that of patients with adenocarcinoma, even in the presence of metastatic disease, and so an aggressive surgical approach should be carried out to accomplish negative pancreatic margins and excision of all visible metastases if feasible.\(^20,21\) Some patients will respond very favorably to systemic or regional chemotherapy.\(^21\)

More than 90% of solid pseudopapillary tumors (formerly known as papillary cystic neoplasms) occur in young women.\(^22-24\) The tumors tend to be large (size range, 8-20 cm) and present with either an asymptomatic epigastric mass or abdominal pain. They are considered to be slow-growing tumors, and hepatic metastases have been rarely described.\(^22\) Histologically, these tumors exhibit a solid and papillary epithelial pattern, often with central necrosis and hemorrhage. Complete excision will be curative in nearly all patients.

Intraductal papillary mucinous neoplasms are the most recently described entity, with numerous reports in the Japanese literature commencing in the early 1980s. Unlike mucinous tumors, patients with this neoplasm tend to be male. These tumors can occur in any segment of the pancreas or be diffuse throughout the gland.\(^25\) They are characterized by papillary projections of epithelium within the main or branch ducts and increased mucous secretion, which may be visible at the ampulla at the time of endoscopic retrograde cholangiopancreatography. Histologic duct changes range from papillary hyperplasia to frank papillary carcinoma, with most patients harboring malignant changes.\(^26-30\) Patients may present with recurrent pancreatitis, pain, weight loss, diabetes, or steatorrhea,\(^31\) and an increased incidence of associated nonpancreatic tumors, especially colorectal neoplasms, has recently been described.\(^32\) While one authority has stated that intraductal papillary mucinous neoplasms and mucinous cystadenomas are part of a spectrum of the same disease,\(^33\) most authorities reject this, owing to differing patient characteristics noted with the 2 entities and differing gross and microscopic pathologic changes.\(^5,20,29,34\) Treatment should consist of complete excision and examination of the pancreatic resection margins,\(^29\) as the dominant pattern of recurrent disease is in the pancreatic remnant.\(^30\)

In summary, the jaundiced or nonjaundiced patient who presents with a cystic or solid pancreatic mass and has no history of pancreatitis has an approximate 1 in 10 chance of not having pancreatic adenocarcinoma but rather a potentially curable benign or malignant pancreatic neoplasm. Failure to recognize this will lead to inappropriate observation or internal or external drainage of cystic masses.\(^35,36\) Cyst fluid analysis for cytology, viscosity, amylase level, and the tumor markers CEA, CA19-9, and CA125 has been suggested as a means of differentiating inflammatory pseudocysts from neoplasms and benign from malignant tumors.\(^37\) Although combinations of these tests may indeed provide accurate information, it is our feeling that, in the absence of a history of pancreatitis, all of these lesions may be assumed to represent neoplasms and should be removed. Likewise, this dilemma cannot be reliably eliminated by percutaneous needle biopsy since the results may be inaccurate and misleading.\(^38,39\) as seen in our study, and also may be accompanied by complications including pancreatitis, hemorrhage, and needle tract seeding of tu-
mor.38-46 In view of this, we feel that percutaneous biopsy, while potentially useful in the management of patients with metastatic or radiologically unresectable pancreatic tumors, has no role in the patient in whom an unknown pancreatic mass appears to be resectable. As increasing numbers of these patients can be anticipated in the future, due to the increased use of imaging studies, we feel that any patient presenting with a resectable pancreatic mass seen on CT scan should be promptly operated on and resection carried out. Under the care of experienced pancreatic surgeons, resection is safe and excellent long-term results may be anticipated.

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Corresponding author: Jack Pickleman, MD, Department of Surgery, Loyola University Medical Center, 2160 S First Ave, Maywood, IL 60153 (e-mail: jpickle@luc.edu).

REFERENCES


DISCUSSION

A. Rahim Moossa, MD, San Diego, Calif: This is an important paper. It should make the list of “essential reading” for some of our nonsurgical colleagues. The authors describe their experience with 40 unusual pancreatic tumors over an 8-year period and compare their findings with their previously reported series to the Western Surgical Association. They note a very modest increased incidence of these tumors, and my first question is whether this is not simply an increase in referral rather than a true increase in incidence. We know too well that once you show an interest in a problem, it gets referred to you more often.

The authors’ conclusions are worth repeating. First, about 12% of all pancreatic masses suspected to be pancreatic exocrine cancer are of a much more favorable variety that can be cured by appropriate surgical excision. In other words, we all know that some of our patients labeled with pancreatic cancer outlive their doctors because of a misdiagnosis.

Their second conclusion is that cystic lesions of the pancreas should not be assumed to be inflammatory pseudocysts, especially in the absence of an obvious history of pancreatitis.
Their third conclusion is even more important: percutaneous or endoscopic biopsies and/or drainage of pancreatic masses should not be routinely performed because of sampling error, interpretative error, the risk of tumor seeding, and the induction of traumatic pancreatitis. We believe that the “best biopsy” is often an appropriate resection provided that it can be safely performed and informed consent has been obtained.

I have a second question for Dr Sheehan and her colleagues. I note that the commonest tumor in both series is neuroendocrine in origin. This is not surprising. However, there are 5 lymphomas and no sarcoma in the first group, and no lymphoma and 3 sarcomas in the second group. There are also 5 solid pseudopapillary tumors and 3 intraductal papillary tumors in their recent series and none in the first series. Do they consider these differences to be genuine, or are they a reflection of the new WHO histopathological classification of pancreatic tumors?

James A. Madura, MD, Indianapolis, Ind: This paper reflects a line from the movie, Field of Dreams: “If you build it, they will come.” That is what Dr Pickleman, Dr Aranha, and his group have done in Chicago and Loyola in a very competitive surgical arena. They have been able to attract numerous patients with these various tumors because their surgical results are good. They have no operative deaths and their morbidity is quite good.

Is your operative outcome with invasive ductal adenocarcinoma as good as it is with these unusual tumors? Tell us about the mortality and morbidity rate in those patients if you can. One of the major complications in these unusual tumors was pancreatic fistula. Dr Pickleman, would you tell us how you sew the pancreas to the jejunum or how you address it when you do a distal pancreatectomy?

Next, you stated that you prefer not to have biopsies ahead of time and Dr Moossa, I think, addressed that, but how do you tell ahead of time that there are good tumors and evil tumors? We have been using endoscopic ultrasound routinely, and between the cooperation of an excellent ultrasonic endoscopist and a very good cytopathologist, we usually get a diagnosis that is fairly accurate. It’s not 100%, but it’s close. We are then able to educate and inform the patients on what we have to do and its prognosis. How vigorously do you go after the preoperative diagnosis, and has your game plan varied with this increased information?

Finally, what do you think the true denominator for this entire group is? Do you get a shot at all patients with a pancreatic mass? Do you get to see every patient who comes through, or are they screened like they are in our program and many others? We have a good relationship with our ERCP colleagues, and therefore I think we have captured that population. But I am not sure that we have captured the other population of primary care physicians. So with this paper, although we have enjoyed it, I think you are preaching to the wrong choir. I feel that this paper needs to be given at primary care meetings and to those physicians who are seeing these patients initially.

Lawrence W. Way, MD, San Francisco, Calif: When managing patients with pancreatic tumors, it is usually possible to separate the cystic from the solid lesions at the outset. I have 2 questions pertinent to management of the cystic lesions.

First, it is not uncommon for small cystic tumors to be discovered as asymptomatic incidental findings on scans done for a reason other than suspected disease in the pancreas. In fact, there were several asymptomatic serous cystadenomas in your series. What in your opinion is the proper management for a small, asymptomatic, incidentally discovered, typical serous cystadenoma? A multicystic, microcystic tumor. We know that such lesions have no malignant potential. Do you recommend that they be followed with periodic scans, or do you have data to support a recommendation that they all be removed?

Second, do you think removal of a mucinous cystadenoma always requires partial pancreatectomy, or can some of them be enucleated? For example, a small superficial mucinous cystadenoma of the head of the pancreas in a young woman. The potential for malignant transformation is recognized, but a Whipple procedure is aggressive in such a patient, if complete enucleation is feasible. Although the literature is divided on this question, we side with those who favor the latter approach (Ann Surg. 1998;227:896).

Thomas A. Stellato, MD, Cleveland, Ohio: I have a question about the intraductal papillary mucinous neoplasm. Since these are thought to be multifocal and diffuse, do you manage these intraoperatively with frozen section? If not, what do you do when you find a positive margin after permanent sections, and how do you follow these patients up? Have you had to do any completion pancreatectomies for this particular lesion?

Michael J. Hart, MD, Seattle, Wash: Since most of these patients were referred from outside institutions, do you have any data on how many of the patients had even been seen by a surgeon before they arrived at Loyola? I think this is one of our problems. The gastroenterologists with all of their new toys think they can drain and take care of almost everything, and they certainly can condemn the patient to endoscopic stenting for what otherwise might be a resectable lesion. So again, were surgeons seeing these patients?

Dr Pickleman: I rather like the concept of Dr Moossa and Dr Pickleman together preaching to the congregation. Dr Moossa questioned whether these tumors we are seeing represent increased referrals to our institution or rather a true increase in the number of lesions. I don’t know. All I know is that as an institution that is well-known in Chicago for dealing with pancreatic problems, we are surely seeing more of these. I think the key message here though is that any patient presenting with a pancreatic mass has over a 1 in 10 chance of not having adenocarcinoma.

He stated that the best biopsy is the surgeon’s biopsy, which is the total excision, and we could not agree more. We have had a number of these patients who were given inappropriate recommendations, oftentimes for many years regarding the treatment of these lesions, and we do not believe that percutaneous biopsy should be carried out preoperatively.

Dr Moossa asked whether or not we are seeing these intraductal papillary neoplasms and the other newer types of tumors more frequently because our pathologists have become better educated. I think that is so. I think that as of 1996, most pancreatic pathologists now are adopting a common nomenclature, and we are now going to see many more of these newer types of tumors rather than their past classification as cystadenoma.

I appreciated Dr Madura’s comments. He is correct that our current results in treating all patients with pancreatic resections are much better than the past. Dr Aranha and I recently reviewed our last 125 Whipple procedures, and in that group there has been 1 death (0.8%) and no patient required reoperation. There were, however, still 17% of those patients who had leaks, and this is a problem that we, like others, are still struggling with. In the management of our pancreatic duct, we either do single-layer invaginations into the stomach as a pancreaticogastrostomy or an end-to-side 1-layer pancreaticojejunostomy. For the distal pancreatectomies we utilize a GIA stapler across the stump of the pancreas with sump drainage.

The role of preoperative biopsy is only for those patients with obviously metastatic or unresectable tumors: we feel that any patient who comes in with a pancreatic mass that is resectable on CT scan should not have a biopsy and should have excision of that tumor. Now we recognize that many of those patients are going to have adenocarcinoma of the pancreas, but there are 3 or 4 articles that would indicate that excision of these tumors, if they are resectable, confers a survival advantage onto those patients.

Dr Madura asked us about the true denominator. I actually think we are fairly close to that in our institution. Between
the gastroenterologists and ourselves, we see pretty much all patients with pancreatic disease in our institution.

Dr Way asked about the cystic lesions. In our series we had 4 of our cystic lesions internally drained obviously inappropriately. Of all of our serous cystadenomas, only 2 of 10 were asymptomatic. So what is the real indication to observe these? I think only in the asymptomatic poor-risk patient, or in the occasional patient who might require a Whipple procedure. We think these lesions should be excised because we have noted progressive growth of these tumors in several patients with subsequent complications.

With regard to the mucinous cystadenomas and the possibility of enucleation, I would quote Clint Eastwood who said: “It depends how lucky you feel.” If you happen to enucleate a malignant lesion, that clearly is inappropriate. So we don’t think that there is a role for enucleation in these lesions, and in addition 2 articles now have shown an increased incidence of morbidity with enucleation rather than formal resection.

Dr Stellato asked about the intraductal papillary cystic neoplasms. We always get a frozen section on our margin in these lesions because we recognize that they can involve the whole gland. Depending on that frozen section, we will proceed to a total pancreatectomy if necessary. We have had no patient yet in whom the frozen section was negative and the permanent section turned out positive whereby we had to go back and resect additional pancreas.

Last, Dr Hart asked how many of these patients who were referred from the outside were seen by a surgeon, and we truly don’t have that information for you.